

Colorfastness to Water

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1. Purpose and Scope

1.1 This test method is designed to measure the resistance to water of dyed, printed, or otherwise colored textile yarns and fabrics.

1.2 Distilled water or deionized water is used in this test method because natural (tap) water is variable in composition.

2. Principle

2.1 The specimen, backed by multifiber test fabric, is immersed in water under specified conditions of temperature and time, and then placed between glass or plastic plates under specified conditions of pressure, temperature and time. The change in color of the specimen and the staining of the attached multifiber test fabric are observed.

3. Terminology

3.1 colorfastness, *n.*—the resistance of a material to change in any of its color characteristics, to transfer of its colorant(s) to adjacent materials or both, as a result of the exposure of the material to any environment that might be encountered during the processing, testing, storage or use of the material.

4. Safety Precautions

NOTE: These safety precautions are for information purposes only. The precautions are ancillary to the testing procedures and are not intended to be all inclusive. It is the user's responsibility to use safe and proper techniques in handling materials in this test method. Manufacturers MUST be consulted for specific details such as material safety data sheets and other manufacturer's recommendations. All OSHA standards and rules must also be consulted and followed.

4.1 Good laboratory practices should be followed. Wear safety glasses in all laboratory areas.

4.2 Manufacturer's safety recommendations should be followed when operating

laboratory testing equipment.

4.3 Observe padder safety. Ensure adequate guard at the nip point. Normal safeguards on pad should not be removed.

5. Apparatus and Materials (see 12.1)

5.1 Perspiration tester (plastic or glass plates are available with the equipment) (see 12.2).

5.2 Drying oven—convection.

5.3 Multifiber test fabrics (8 mm [0.33 in.] filling bands) containing acetate, cotton, nylon, silk, viscose rayon and wool shall be used for specimens containing silk, or (8 mm [0.33 in.] filling bands) containing acetate, cotton, nylon, polyester, acrylic and wool shall be used for specimens with no silk present.

5.4 AATCC Chromatic Transference Scale (see 12.3).

5.5 AATCC Gray Scale for Color Change and Gray Scale for Staining (see 12.3).

5.6 Wringer.

6. Test Solution

6.1 Freshly boiled, distilled water or deionized water from an ion-exchange device.

7. Test Specimens

7.1 If the specimen to be tested is a fabric, attach a piece of multifiber adjacent fabric also measuring $5 \times 5 \pm 0.2$ to the specimen measuring $6 \times 6 \pm 0.2$ cm by sewing along one of the shorter sides, with the multifiber fabric next to the face of the specimen.

7.2 If the specimen to be tested is a yarn or loose fiber, take a mass of the yarn or loose fiber approximately equal to one half of the combined mass of the adjacent fabrics. Place it between a $5 \times 5 \pm 0.2$ cm piece of multifiber fabric and a $6 \times 6 \pm 0.2$ cm piece of the non-dyeable fabric, and sew along all four sides.

8. Procedure

8.1 Immerse the test specimen in the test solution which is at room temperature with occasional agitation to ensure thorough wetting out (approximately 15 min generally required for average fabrics) (see 12.4).

8.2 Remove the test specimen from the test solution and only pass between squeeze rolls (wringer) to remove excess liquor when the wet weight of the test

specimen is more than 3 times its dry weight. Whenever possible, the wet weight should be 2.5-3.0 times the dry weight.

8.3 Place the test specimen between glass or plastic plates and insert in the specimen unit of the perspiration tester. Adjust the perspiration tester to produce a pressure of 4.5 kg (10.0 lb) on the test specimen (see 12.2).

8.4 Heat the loaded specimen unit in an oven at $38 \pm 1^\circ\text{C}$ ($100 \pm 2^\circ\text{F}$) for 18 h.

8.5 Remove the tester from the oven and for each test specimen assembly, separate the multifiber fabric and, if used, the adjacent fabric from the test fabric. Place the multifiber fabric and test fabric specimens separately on a wire screen in a conditioned atmosphere $21 \pm 1^\circ\text{C}$ ($70 \pm 2^\circ\text{F}$) and $65 \pm 2\%$ relative humidity overnight.

9. Evaluation Method for Color Change

9.1 Rate the effect on the color of the test specimens by the Gray Scale for Color Change.

Grade 5—negligible or no change as shown in Gray Scale Step 5.

Grade 4.5—change in color equivalent to Gray Scale Step 4-5.

Grade 4—change in color equivalent to Gray Scale Step 4.

Grade 3.5—change in color equivalent to Gray Scale Step 3-4.

Grade 3—change in color equivalent to Gray Scale Step 3.

Grade 2.5—change in color equivalent to Gray Scale Step 2-3.

Grade 2—change in color equivalent to Gray Scale Step 2.

Grade 1.5—change in color equivalent to Gray Scale Step 1-2.

Grade 1—change in color equivalent to Gray Scale Step 1.

10. Evaluation Method for Staining

10.1 Rate the staining of the multifiber test fabric (see 12.5) by the AATCC Chromatic Transference Scale or the Gray Scale for Staining. Report which classification scale is used (see 12.6).

Grade 5—negligible or no color transfer.

Grade 4.5—color transfer equivalent to Step 4-5 on the Gray Scale for Staining or Row 4.5 on the 9-step AATCC Chromatic Transference Scale.

Grade 4—color transfer equivalent to Step 4 on the Gray Scale for Staining or Row 4 on the 9-step AATCC Chromatic

Transference Scale.

Grade 3.5—color transfer equivalent to Step 3-4 on the Gray Scale for Staining or Row 3.5 on the 9-step AATCC Chromatic Transference Scale.

Grade 3—color transfer equivalent to Step 3 on the Gray Scale for Staining or Row 3 on the 9-step AATCC Chromatic Transference Scale.

Grade 2.5—color transfer equivalent to Step 2-3 on the Gray Scale for Staining or Row 2.5 on the 9-step AATCC Chromatic Transference Scale.

Grade 2—color transfer equivalent to Step 2 on the Gray Scale for Staining or Row 2 on the 9-step AATCC Chromatic Transference Scale.

Grade 1.5—color transfer equivalent to Step 1-2 on the Gray Scale for Staining or Row 1.5 on the 9-step AATCC Chromatic Transference Scale.

Grade 1—color transfer equivalent to Step 1 on the Gray Scale for Staining or Row 1 on the 9-step AATCC Chromatic Transference Scale.

11. Precision and Bias

11.1 *Precision.* Precision for this test

method has not been established. Until a precision statement is generated for this test method, use standard statistical techniques in making any comparisons of test results for either *within-laboratory* or *between-laboratory* averages.

11.2 *Bias.* Colorfastness to water can be defined only in terms of a test method. There is no independent method for determining the true value. As a means of estimating this property, the method has no known bias.

12. Notes

12.1 For potential equipment information pertaining to this test method, please visit the online *AATCC Buyer's Guide* at <http://www.aatcc.org/bg>. AATCC provides the possibility of listing equipment and materials sold by its Corporate members, but AATCC does not qualify, or in any way approve, endorse or certify that any of the listed equipment or materials meets the requirements in its test methods.

12.2 Horizontal Perspiration Tester: Put all 21 glass or plastic plates into the unit regardless of the number of specimens. After the final glass or plastic plate is put in position on top, set the dual plates with compensating springs in position. Place the 3.6 kg (8.0 lb) weight on top

making a total of 4.5 kg (10.0 lb) under the pressure plate. Lock the pressure plate in position by turning the thumb-screws. Remove the weight. Place the unit in the oven on its side, so that the plates and the specimens are vertical.

Vertical Perspiration Tester: The plates are held in a vertical position between an indicating scale with a fixed metal plate at one end and an adjustable metal plate at the other end. By means of adjusting screws, the movable plate may be made to exert increasing pressure against the test specimens. When the desired pressure of 4.5 kg (10.0 lb) is indicated on the scale, lock the specimen in it by a set screw. The specimen unit can now be removed from the section applying the pressure. Another specimen unit can be added to the pressure section and the loading procedure repeated.

12.3 Available from AATCC, P.O. Box 12215, Research Triangle Park NC 27709; tel: 919/549-8141; fax: 919/549-8933; e-mail: orders@aatcc.org; web site: www.aatcc.org.

12.4 Or immerse the test specimen in the test solution at room temperature, pass through squeeze rolls (wringer) and reimmerse. Repeat, if necessary, to attain thorough wetting out.

12.5 Classify according to the fiber showing the greatest stain.

12.6 For very critical evaluations and in cases of arbitration, ratings must be based on the Gray Scale for Staining.